CLAIMS

1. A drive circuit of a direct-current voltage-driven magnetic contactor including an operating coil that is capable of a direct-current excitation, a main contact that is in an open circuit condition in an attracting period of an initial period of excitation by the operating coil and is in a closed circuit condition in the following holding period, and an auxiliary contact that carries out a reverse opening and closing operation from the main contact is connected to a positive electrode side of the exciting direct-current power supply and the other end of the same is connected to one end of the auxiliary contact, the drive circuit comprising:

a starting semiconductor switching element provided between the other end of the auxiliary contact and a negative electrode side of the exciting direct-current power supply;

a direct-current voltage detecting circuit that outputs a start instruction signal when an applied voltage of the exciting direct-current power supply has exceeded a predetermined value;

a driving direct-current power supply whose negative electrode side is connected to the negative electrode side of the exciting direct-current power supply;

a first drive circuit that makes the starting semiconductor switching element perform an ON operation upon receiving the start instruction signal, using the driving direct-current power supply as an operating power supply;

a charging capacitor whose one end is connected to a positive electrode side of the driving direct-current power supply via a diode and whose other end is connected to the other end of the auxiliary contact;

a current limiting semiconductor switching element connected in parallel to the auxiliary contact; and

a second drive circuit that makes the current limiting semiconductor switching element perform a switching operation when a terminal voltage of the charging capacitor has reached a predetermined value.

2. The drive circuit of a direct-current voltage-driven magnetic contactor according to claim 1, wherein

a current detecting resistor is inserted between the other end of the auxiliary contact and a corresponding terminal of the current limiting semiconductor switching element, and

the second drive circuit monitors a terminal voltage of the current detecting resistor and carries out control so as to make the current limiting semiconductor switching element perform an ON/OFF operation at a fixed cycle when the terminal voltage is equal to or less than a prescribed value while extending an OFF operation period of the current limiting semiconductor switching element when the terminal voltage has exceeded a prescribed value.

3. The drive circuit of a direct-current voltage-driven magnetic contactor according to claim 1, wherein

a current detecting resistor is inserted between the other end of the auxiliary contact and a corresponding terminal of the current limiting semiconductor switching element, and an RC low-pass filter is provided between the current detecting resistor and the second drive circuit that carries out a reverse opening and closing operation from the main contact, and

the second drive circuit monitors a terminal voltage of the current detecting resistor via the RC low-pass

filter and carries out control so as to make the current limiting semiconductor switching element perform an ON/OFF operation at a fixed cycle when the terminal voltage is equal to or less than a prescribed value while extending an OFF operation period of the current limiting semiconductor switching element when the terminal voltage has exceeded a prescribed value.

4. A power converter provided with a rectifying circuit that forward-converts an inputted alternating-current power to a direct-current power, a smoothing capacitor that smoothes a direct-current power forward-converted by the rectifying circuit and holds the same as a direct-current bus voltage, a switching circuit that inverse-converts a direct-current bus voltage held by the smoothing capacitor to an alternating-current by switching the same by semiconductor switching elements, and an inrush current suppression circuit provided between the rectifying circuit and smoothing capacitor, wherein

the inrush current suppression circuit is constructed by connecting a current limiting resistor and a main contact of a direct-current voltage-driven magnetic contactor in parallel,

in the direct-current voltage-driven magnetic contactor, one end of an operating coil capable of a direct-current excitation is connected to a positive electrode side of the direct-current bus voltage, and the other end is connected to one end of the auxiliary contact, and

a drive circuit of the direct-current voltage-driven magnetic contactor comprises:

a starting semiconductor switching element provided between the other end of the auxiliary contact and a

negative electrode side of the exciting direct-current power supply;

a direct-current voltage detecting circuit that outputs a start instruction signal when an applied voltage of the exciting direct-current power supply has exceeded a predetermined value;

a driving direct-current power supply whose negative electrode side is connected to the negative electrode side of the exciting direct-current power supply;

a first drive circuit that makes the starting semiconductor switching element perform an ON operation upon receiving the start instruction signal, using the driving direct-current power supply as an operating power supply;

a charging capacitor whose one end is connected to a positive electrode side of the driving direct-current power supply via a diode and whose other end is connected to the other end of the auxiliary contact;

a current limiting semiconductor switching element connected in parallel to the auxiliary contact; and

a second drive circuit that makes the current limiting semiconductor switching element perform a switching operation when a terminal voltage of the charging capacitor has reached a predetermined value.

5. The power converter according to claim 4, wherein

a current detecting resistor is inserted between the other end of the auxiliary contact and a corresponding terminal of the current limiting semiconductor switching element, and

the second drive circuit monitors a terminal voltage of the current detecting resistor and carries out control so as to make the current limiting semiconductor switching

element perform an ON/OFF operation at a fixed cycle when the terminal voltage is equal to or less than a prescribed value while extending an OFF operation period of the current limiting semiconductor switching element when the terminal voltage has exceeded a prescribed value.

6. The power converter according to claim 4, wherein

a current detecting resistor is inserted between the other end of the auxiliary contact and a corresponding terminal of the current limiting semiconductor switching element, and an RC low-pass filter is provided between the current detecting resistor and the second drive circuit, and

the second drive circuit monitors a terminal voltage of the current detecting resistor via the RC low-pass filter and carries out control so as to make the current limiting semiconductor switching element perform an ON/OFF operation at a fixed cycle when the terminal voltage is equal to or less than a prescribed value while extending an OFF operation period of the current limiting semiconductor switching element when the terminal voltage has exceeded a prescribed value.